RR14.

Perioperative Cardiac Events in Endovascular Thoracoabdominal Aneurysm Repair: Association with preoperative studies and long term prognosis

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Objectives: Cardiac complications are common following repair of thoracoabdominal aneurysms. Endovascular repair obviates the need for aortic cross-clamping, large incisions, and marked fluid shifts, yet has still been associated with significant cardiac morbidity. This study was undertaken to evaluate cardiac morbidity following endovascular thoracoabdominal aneurysm repair.

Methods: A single-center trial over a 5 year period included all patients who underwent thoracoabdominal aneurysm repair with branched devices was reviewed to evaluate cardiac complications within 30 days of implantation, including: STEMI, NSTEMI (including troponin >0.1), and fatal arrhythmias. Preoperative characteristics (echocardiographic results, functional testing, and cardiac related symptoms) were compared using univariate analyses, and independent risk factors for perioperative cardiac events were determined using a multivariate analysis. Analyses were also performed to determine association between perioperative rise in troponin and long term death.

Results: In total, 395 patients underwent endovascular thoracoabdominal repair in the period between 2003 and December 2007. Post operative troponin levels peaked to >0.1 ng/mL in 12% (33/268) of the patients. The mean peak troponin was 0.5 ng/mL (SD 0.51) in this subset of patients, most commonly on post operative day 4 (SD 1.54). There were 2 cardiac-related death (both with troponin levels >0.1, 2/33, 6%) in the perioperative period. Of the patients that had cardiac complications, 30 had echocardiography documented and 5 had cardiac catheterizations preoperatively.

Conclusions: Lethal cardiac complications are uncommon following endovascular thoracoabdominal aneurysm repair. However, troponin levels (in excess of 0.1 ng/mL) are relatively common indicating that there may remain a significant cardiac risk. The optimal preoperative testing paradigm remains to be determined and should the subject of further evaluation.

Author Disclosures: T.M. Mastracci, Cook Medical, Inc; **R. Greenberg,** Cook Medical, Inc; Gore; Terarecon; Cook Medical Inc; Cook Medical Inc.

RR15.

Age Related Trends in Abdominal Aortic Aneurysms: Repairs, Rupture, and Death Rates in the United States Medicare Population

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Objective: Recently the UK and ADAM small AAA trials showed that repair could safely be deferred in small AAA. EVAR has allowed safer elective AAA repair. We evaluated total AAA related mortality over the time period inclusive of these landmark events.

Methods: All US Medicare beneficiaries undergoing AAA repair, intact (iAAA) or ruptured (rAAA), or hospitalized for rupture without repair from 1996-2006 were identified. Event rates per 100,000 beneficiaries were compared in the young (65-74) and elderly (≥75) between 1996 and 2006.

Results: iAAA decreased in the young but increased in the elderly (Table). In 2006 more iAAA were EVAR in the elderly (71%) than young (64%). Despite the increased rate of repair in the elderly, the population death rate from iAAA decreased more in the elderly than the young. AAA ruptures and rupture deaths decreased in both groups but more so in the elderly. Overall AAA related deaths have decreased in all Medicare beneficiaries but more so in the elderly. Despite this, the AAA related death rate of those over 74 is still 3 times that of those 65-74.

Conclusions: AAA rupture is decreasing in the young despite the deferral of elective AAA repair suggesting a decreasing incidence of AAA. EVAR has lowered the operative risk of iAAA while repair has expanded in the elderly. EVAR has likely allowed treatment of patients previously considered unfit for OAR yet still at risk for rupture. Total AAA related deaths are decreasing likely due in part to expanded treatment in the elderly with lower operative mortality with EVAR as well as lower incidence of AAA.

Rates of intact and ruptured AAA repairs, AAA rupture, and AAA-related deaths

	1996		*2006*		*Absolute change*			
*Rates (per 100,000)**	*<75 Years*	*>≥75 Years*	*<75 Years*	*≥75 Years*	*<75 Years*	*≥75 Years*	*<75 Years*	*≥75 Years*
Intact Repair	93.9	92.3	82.3	112.4	−12	+20	P < .001	P < .001
Rupture Diagnosis (with or without repair)	20.0	34.1	9.4	20.8	−11	−13	P < .001	P < .001
Rupture Repair	14.6	19.9	6.4	10.3	−8	−10	P < .001	P < .001
Death Rates								
All AAA-Related	12.9	30.3	5.7	17.3	−7	−13	P < .001	P < .001
Intact Repair	3.6	6.9	1.7	3.8	−2	−3	P < .001	P < .001
Rupture Diagnosis (with or without repair)	9.3	23.4	4.0	13.6	−5	−10	P < .001	P < .001
Rupture Repair	5.6	11.0	2.1	5.0	−3	−6	P < .001	P < .001

*Rates adjusted for gender.

Age-stratified mortality rates in 1996 and 2006 after open AAA repair and EVAR

Repair mortality	*1996*		*2006*		*Absolute change*			
Open and EVAR	*<75 Years*	*≥75 Years*	*<75 Years*	*≥75 Years*	*<75 Years*	*≥75 Years*	*<75 Years*	*≥75 Years*
Intact Repair	3.8%	7.5%	2.1%	3.4%	−1.8%	−4.2%	P < .001	P < .001
Rupture Repair	38.4%	55.4%	32.8%	48.5%	−5.5%	−6.9%	P < .01	P < .001
Open								
Intact Repair	3.8%	7.5%	4.0%	7.4%	0.2%	−0.1%	P = .40	P = .75
Rupture Repair	38.4%	55.4%	34.5%	51.4%	−3.9%	−4.0%	P < .05	P < .05
EVAR								
Intact Repair			1.0%	1.7%				
Rupture Repair			23.6%	36.2%				

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RR16.

Duplex Scanning After Infrainguinal Endovascular Therapy for Critical Limb Ischemia

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Objective: Duplex ultrasound scanning (DUS) has benefit for evaluation of surgical bypasses in the lower extremities. The utility of DUS with endovascular revascularizations is not established. This study was performed to evaluate whether DUS findings after infra-inguinal endovascular interventions for critical limb ischemia (CLI) were predictive of need for early reintervention or patients' amputation-free survival.

Methods: To identify the study cohort, peripheral interventions for CLI (Rutherford grades 4,5,6) over a 24 month period (2006-2007) were reviewed. DUS findings were considered abnormal if the peak systolic velocity (PSV) was ≥180 cm/s or the PSV velocity ratio was ≥2.0. Demographic, clinical, procedural, and outcomes were examined. SVS and TASC II classifications and reporting standards were used. Arteriograms were reviewed and treated segments were categorized as patent (<30% residual stenosis) or abnormal (≥30% residual stenosis).

Results: There were 144 infra-inguinal interventions for CLI in 114 patients (52 % male; mean age 68.8 y); 123 limbs were treated. Treated segments were TASC II C or D, or had severe infra-popliteal disease in 68%. Risk factors included diabetes: 25%; renal failure: 11%; smoking (within 1 y): 23%.Mortality at 12 months was 16.7%; with a preceding major amputation in 4 of 19. DUS was performed within 30 days of the index procedure in 90 cases. A normal DUS finding was associated with better limb salvage (p = 0.06). Abnormal early DUS findings were noted after 26 CLI interventions that had no demonstrated residual abnormality with completion angiography (47%).

LIMBS WITH CRITICAL LIMB ISCHEMIA
Analysis **per limb** *treated: Outcomes at 12 months* for patients with DUS within 30 days

	Lost to follow-up (n = *24*)	*Primary patency* *(%)*	*Reinter-ventions* (n)	*Secondary patency* *(%)*	*Open revasc-ularization* *(n)*	*Amputation* n *(%)*
Normal DUS (*n* = 40)	4	70.1	6	88.9	2	2 (5.6)
Abnormal DUS (*n* = 50)	2	46.2	13	71.8	3	10 (20.1)

Conclusions: DUS detects residual stenoses missed with angiography after CLI interventions. An abnormal DUS within 30 days after an intervention was associated with increased risk of treatment failure (need for secondary procedures, limb loss). This suggests a role for intra-procedural DUS, as well as routine post-procedure DUS, close clinical follow up, and consideration of re-intervention for residual abnormalities.

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RR17.

Predictors of Failure and Success of Tibial Interventions for Critical Limb Ischemia

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Objective: The efficacy of tibial artery endovascular intervention (TAEI) for critical limb ischemia (CLI) and particularly wound healing remains to be fully determined.

Methods: All TAEIs for tissue loss or rest pain (Rutherford 4/5/6) from 2004-2008 were reviewed. Clinical outcomes and patency rates were analyzed by multivariable Cox proportional hazards regression and life table analysis.

Results: 123 limbs in 111 patients (62% male, mean age 74) underwent TAEI. 102 limbs (83%) had tissue loss. All interventions included tibial angioplasty (PTA) with selective atherectomy (17 %); 20% of limbs underwent interventions on >1 tibial vessel. 50 limbs (41%) underwent isolated tibial procedures while 73 had concurrent ipsilateral SFA or popliteal intervention. The mean distal popliteal and tibial runoff score improved from 11.8 ± 3.6 to 6.7 ± 1.6 and the mean ABI increased from 0.61 ± 0.26 to 0.85 ± 0.22. 5 patients (4%) required bypass. One-year primary, primary-assisted and secondary patency rates were 33%, 50% and 56% respectively. Limb salvage rate at one-year was 75% (table). TAEI in an isolated peroneal artery (OR 7.80, p=0.01) was associated with impaired wound healing, whereas multilevel intervention (HR=2.1, p=0.009) and tibial laser atherectomy (HR=3.1, P=0.01) were predictors of wound healing. In patients with tissue loss, 41% achieved complete closure (mean time to healing 10.7±7.4 months) and 39% improved (mean FU 4.4 ± 4.8 months) at last follow up. Diabetes, smoking, statin therapy, and revascularization of >1 tibial had no impact on limb salvage or wound healing. Re-intervention rate was 50% at 1 year (.table) and was unaffected by prior atherectomy.

Conclusions: TAEI is an effective treatment for CLI with acceptable limb salvage and wound healing. Multiple tibial vessel revascularization has no impact on limb salvage but debulking is associated with improved wound healing. Patients with renal failure, pedal disease or isolated peroneal runoff have poor results with TAEI and should be considered for pedal bypass.

	HR	*95% CI*	*p-value*
Limb Loss			
Renal failure	5.73	1.16-28.24	0.03
CABG	3.42	1.13-10.33	0.03
Dorsalis Pedis Intervention	13.75	1.08-174.74	0.04
Reintervention			
Peroneal intervention	3.41	1.61-7.25	0.001
Dorsalis Pedis Intervention	6.91	0.84-56.95	0.07
Multilevel intervention	2.45	1.06-4.78	0.036

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RR18.

Comparable Limb Salvage, Patency and Survival Rates Following Open and Endovascular Revascularizations in African Americans

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Objective African Americans (AA) have been reported to have poorer early and late patency and limb salvage (LS) rates following bypass procedures. The goal of this study is compare the results of AA and Caucasians (CAU) who present with symptomatic peripheral arterial disease (PAD).

Methods All AA and CAU patients who presented with symptomatic PAD between 06/2001-06/2008 were included.

Results Of the 698 patients (799 limbs), 93 were AA, and 706 were CAU. AA were more likely to be non-ambulatory, have poorer functional capacity (≤4 METS), renal failure, dialysis-dependence, lower albumin levels and present with gangrene, whereas CAU had more CAD, hyperlipidemia, and COPD (Table I). Significantly more AA had primary amputation (PA, 14% vs 6%, P<0.001). Of those who underwent revascularization, 62% and 61% in AA and CAU groups had endovascular procedures. Infrapopliteal and multilevel interventions were significantly more frequent in AA (Table I). Perioperative morbidity and mortality were similar. Patency rates, limb salvage and survival were similar in AA and CAU who underwent revascularization (Table II). Multivariate analysis showed diabetes, gangrene, infrapopliteal interventions and functional capacity independently predicted limb loss, whereas race did not.

Conclusions Among patients presenting with symptomatic PAD, AA patients were more likely to have poorer functional status, renal failure, present with gangrene and have lower albumin levels than CAU patients, and were more likely to undergo PA. However, survival, limb salvage and patency rates were similar following open and endovascular revascularizations, although AA were more likely to have infrapopliteal and multilevel interventions.

Table I. Differences between groups for comorbidities, and clinical presentation.

	AA	*Caucasian*	*P*
CAD	46%	62%	0.005
DM	54%	49%	0.0378
Hyperlipidemia	58%	71%	0.011
COPD	14%	26%	0.001
Renal insuff/dialysis	40%/19%	25%/6%	0.003
≤4 METS/non-ambulatory	60%/21%	48%/16%	0.036
DC/ Gangrene/ foot sepsis	11%/43%/5%	32%/27%/1%	<0.001
Infrapop/multilevel	51%/51%	27%/30%	<0.001
Albumin	3.0±0.6	3.4±0.7	<0.001

Table II. Patency, limb salvage and survival rates for AA and Caucasians with different types of int

	PP (12mo)	*PP (36mo)*	*SP (12mo)*	*SP (36mo)*	*LS (12mo)*	*LS (36mo)*	*Survival (12mo)*	*Survival 36mo)*
AA (n=80)	80±5%	66±7%	86±5%	81±5%	80±5%	78±5%	78±5%	66±6%
CAU (n=664)	72±2%	64±3%	87±1%	79±2%	86±2%	78±3%	80±2%	61±2%
P		0.891		0.984		0.528		0.727
AA EV (n=50)	82±6%	67±9%	92±5%	87±6%	87±6%	82±7%*	79±6%	58±9%**
CAU (n=406)	80±2%	67±3%	92±2%	85±2%	87±2%	79±4%	81±2%	61±3%
P		0.913		0.709		0.887		0.634
AA, open (n=30)	75±8%	64±10%	77±8%	72±9%	71±9%	71±9%*	76±8%	73±8%**
CAU open (n=258)	73±3%	59±4%	81±3%	71±4%	85±3%	76±4%	88±3%	62±3%
P		0.944		0.832		0.312		0.420

*P=0.190 (AA EV vs open LS).

**P=0.471 (AA EV vs open survival).